Agricultural Waste Management

-working with animal waste materials in ways conducive to improvement of agricultural operations. Practices include:

Utilization
Transfer
Closure

Utilization involves using manure, wastewater, or other organic residues on land. Benefits include a decrease in water quality impacts, optimum nutrient levels for crops, forage, fiber production and forest products, improve or maintain soil structure, and an energy source.

Transfer is the practice of using various structures, conduits, and/or machinery to move waste from its origin to a storage/treatment facility, a loading area, and/or agricultural land for utilization practices.

Closure is the ending of use of a waste impoundment that is no longer used for its intended purpose. Doing this helps protect the quality of surface and groundwater, eliminate human and livestock safety hazards, and safeguard public health. Old structures can be made to hold fresh water or can be filled in or removed.

Estimated costs include:

$46.50/acre (ac) for waste application
$0.31/yd^3 for waste closure
$9,519/ Comprehensive Nutrient Management Plan
$53/ft^3 for waste transfer

Conservation Cover and Buffers

-using vegetation as a sediment and erosion control method in key areas. Practices include

Filter Strips
Grassed Waterways
Swales

Filters Strips are areas of herbaceous vegetation that remove contaminants from overland flow. Benefits include a reduction in suspended solids and decreases in dissolved contaminate loadings in runoff. This practice is most suitable to sensitive areas in need of sediment protection, and that have many suspended solids and dissolved contaminants in the runoff.

Grassed Waterways are drainage channels with suitable vegetation to carry surface water at non-erosive velocities to a stable outlet. Benefits include a conveyance of runoff, a reduction in gully erosion, and protection or improvements in water quality. This practice is suggested for areas in need of erosion control from concentrated runoff.

Swales are similar to Grassed Waterways, but are usually made with more than just grasses. Various bushes and trees are also implemented. Swale implementation is common in urban settings.

Estimated costs include:

$452/ac for seedings and plantings
$4,345/ac for installed waterways and swales

Conservation Tillage

-year-round surface soil residue management practices. Two practices are

Mulch Till
No Till/Strip Till

Mulch Till refers to the limiting of soil-disturbing activities used to grow crops where an entire field is tilled. Benefits of Mulch Till include a reduction in sheet, wind, and rill erosion, a decrease in soil particulate emissions, a management or improvement of soil conditions, an increase in moisture available to plants, and an increase in food and escape cover for wildlife.

No Till or Strip Till is similar, but is applicable to crops in narrow slots, tilled or residue-free strips in soil that was previously untilled by full-width inversion implements. All the benefits of Mulch Till practices can be found in No Till or Strip Till practices in addition to improving soil organic matter content and decreasing carbon dioxide soil losses. Implements not considered to be full-width or capable of full disturbance are used in these practices.

Estimated costs can range anywhere from $11 to $52 per acre.

Cover Crops

-planting of non-income crop for improved soil health and erosion control.

Various grasses, legumes, and forbs can be planted on any land in need of cover during non-growing seasons. Benefits of using cover crops include a reduction in soil erosion and compaction, an increase in soil organic matter content and biodiversity, the ability to capture and recycle or redistribute nutrients in the profile of the soil and more properly manage soil moisture, the promotion of biological nitrogen fixation, a decrease in energy use, and weed suppression. A few example crops that can be used are clovers, oats, rye, and radishes.

Estimated costs can range around $56 per acre.

Critical Area Stabilization

-protection of heavy use areas.

This practice involves stabilizing areas that are frequently and intensively used by people, animals, or vehicles. This is accomplished by establishing a vegetative cover, surfacing it with suitable mats, and/or installing needed structures. Benefits of area stabilization include a stable, non-eroding surface and protection and possible improvement of water quality. This practice is applicable to agricultural, urban, recreational, and other non-linear areas. Surface treatment materials can include various concrete applications, aggregates, sprays and mulches, and other various surfacing materials.

Estimated costs can range around $1.50 per square foot.

Denitrifying Bioreactors

-removing excess nitrogen using a carbon source within a structure.

This practice uses a special structure with a built-in source of carbon to reduce the nitrate content of subsurface and ground water. This practice helps improve overall water quality. It can be used for at least 10 years. It can be used separately from or in conjunction with a Nutrient Management Plan and/or a Drainage Water Management plan.

Estimated costs for this practice can be around $7,830 per structure.

Drainage Water Management

-managing water discharge from ground water and tile drainage systems.

This practice involves planning to allow for proper use and release of water. Benefits of this practice include a decrease in nutrient, pathogen, and/or pesticide loading from drainage systems, a decrease in oxidation of organic matter in soils, a reduction in wind erosion or particulate matter (dust) emissions, an increase in productivity, health, and vigor of plants, and to provide seasonal habitats for wildlife. This is applicable to lands with drainage systems that are adapted to allow management of drainage discharge. This practice is not for irrigation water of subsurface drainage supply. Control structures can be used as a part of this practice. Water control structures convey water, control the direction or rate of flow, maintain desired water surface elevation, or can measure water. They can control the stage, discharge, distribution, delivery, or direction of water flow.

Estimated costs for this practice can range from $24 per acre for annual labor costs and around $1,465 per control structure.

Media Filters

-filtering storm water using materials such as sand, mulch, or other organic materials.

This practice involves building structures (usually with 2 chambers) to help filter out solids and excess nutrients from storm water runoff. The initial chamber is for settling of larger sediment. The second chamber is the filter bed with the media filter. These structures are commonly found in urban areas, but can be used in almost any area in need of filtration. The most common material of sand can be used in combination with peat to help remove more metals from the water. Several modifications are available for various spatial and design applications. Aboveground and underground structures can be implemented.

Estimated costs can average around $5 per cubic foot of storm water to be treated.

Nutrient Management

-managing multiple aspects of nutrient concerns.

This practice involves managing the amount, source, placement, form and timing of nutrient applications, and soil amendments. The reasons to implement this practice include budgeting and supplying nutrients for plant production, properly utilizing commercial fertilizers, animal manures, and other materials as resources for plant nutrients and soil amendments, minimizing agricultural pollution of surface and groundwater resources, and to maintain or improve the physical, chemical, and biological condition of the soil.

Estimated costs for this practice can range from $13.25 per acre for adaptive nutrient management to around $2,128 dollars for a Nutrient Management Plan.

Pasture Management

-prescribed rotational grazing for livestock.

This practice involves strategically moving livestock across sections of a pasture (paddocks) at set intervals of time so that the vegetation of the pasture can be managed at growth rates best suited to each producer. Benefits of rotational grazing include a reduction in weeds and erosion, limiting soil compaction, lengthening the grazing season, improving the productivity of the animals, and improved nutrient distribution across the pasture.

Estimated costs for this practice can be around $28 per acre. Startup costs include those for fencing and water distribution.

Septic System Upgrades

-improving a septic system in various ways.

This practice involves improving or updating parts of a septic system. This could involve repairing or replacing tanks or drainage systems, or even adding a denitrification unit. Benefits of this practice include a decrease in nitrogen, phosphorus, bacteria, and algae, and an increase in oxygen in the water.

Costs can vary greatly depending on the upgrades implemented.

Stormwater Infiltration

-guiding precipitation to drain more naturally.

This practice is more applicable to urban settings since impervious covers can have negative impacts on natural environments. Many different things can be implemented, but some of the smaller-scale practices include permeable pavement, filter strips, rain gardens, and subsurface infiltration systems. These practices allow stormwater to drain in a proper manner by having it absorbed through the soil profile, transferring it through planned channels, or storing it for future usage.

Estimated costs can vary greatly depending on the type and extent of practices implemented.

Streambank Stabilization

-preventing erosion on the banks of waterways. Preventing erosion allows for waterways to be more stable, which in turn can lower land management costs. Practices include:

Exclusion Fencing
Bank/Channel Stabilization
Channel Reconstruction (2-stage ditch)

Exclusion fencing involves the installation of a fence between livestock and water bodies and waterways. Preventing them from entering these waters will help stop erosion from the livestock being on the banks, and will decrease the amount of bacteria in the waters from waste of the livestock.

Bank or channel stabilization involves using suitable structures on the bank of a waterway to help stop erosion. This will help control aggradation and degradation within the waterway. It can help prevent land loss. It can help maintain flow capacity within the channel, reduce the downstream effects of sediment, and improve or enhance the corridor for fish and wildlife habitat, aesthetics, and recreation.

Channel reconstruction, or a 2-stage ditch, is a practice commonly implemented on headwater streams in agricultural settings. It involves adding vegetated floodplain benches of at least twice the width of the channel to the waterway. Benefits of this practice include improving invertebrate community diversity, increasing the number of sensitive intolerant indicator species, diversifying the habitat (riffle-pool flow), decreasing nitrogen levels, bank sloughing, and maintenance activity, improving sediment removal and ditch bank stability, and increasing the capacity of the waterway.

Estimated costs can range from $1.50 per foot of fencing to $11.50 per foot of a 2-stage ditch.

Water and Sediment Control Basins

-constructions across the slope of a watercourse to control sediment and water flows.

Earth embankments or ridge and channel combinations can be constructed across the slope of minor watercourses to form sediment traps and water detention basins with stable outlets. Benefits of this practice include reducing the erosion in a watercourse or gully, a reduction in onsite and downstream runoff, and the trapping of sediment. These basins are most suitable for areas with irregular topography, where watercourse or gully erosion is a problem, where sheet and rill erosion is controlled by other conservation practices, where runoff and sediment damages land and works of improvement, and where adequate outlets can be provided.

Estimated costs can be around $2,884 per structure.